STATE OF ALASKA

THE REGULATORY COMMISSION OF ALASKA

Before Commissioners:

Robert M. Pickett, Chair
Stephen A. McAlpine
Rebecca L. Pauli
Norman Rokeberg
Janis W. Wilson

In the Matter of the Tariff Revision Designated as TA 158-126, filed by MUNICIPALITY OF ANCHORAGE d/b/a ANCHORAGE WATER AND WATEWATER UTILITY, for its Wastewater Utility, for Interim and Permanent Rate Relief	TA 158-126

PRE-FILED DIRECT TESTIMONY OF BENTE VILLADSEN

November 16, 2016

Table of Contents

Page

I. INTRODUCTION AND SUMMARY 3

II. APPROACH TO ESTIMATING THE COST OF CAPITAL 6

A. PRELIMINARY COMMENTS 6

1. Cost of Capital and Risk 7
2. The Impact of Risk on the Cost of Capital 10

III. IMPACT OF THE ECONOMY AND MARKETS ON THE COST OF EQUITY 19

A. INTEREST RATES 19

B. MARKET VOLATILITY and Other Market Phenomena 26

C. IMPACT ON ROE ESTIMATION 32

IV. ANALYZING THE COST OF EQUITY 33

A. APPROACH 33

B. SAMPLE SELECTION 35

C. THE CAPM BASED COST OF EQUITY ESTIMATES 38

1. Inputs to the CAPM 39
2. The Empirical CAPM 42
3. Results from the CAPM Based Models 44

D. THE DCF BASED ESTIMATES 50

1. Single- and Multi-Stage DCF Models 50
2. DCF Inputs and Results 52

E. RISK PREMIUM MODEL ESTIMATES 55

V. RISK CHARACTERISTICS AND THE COST OF EQUITY 57

A. BACKGROUND 57

EXHIBIT BV-01: RESUME OF DR. BENTE VILLADSEN

EXHIBIT BV-02: TECHNICAL APPENDIX

EXHIBIT BV-03: COST OF EQUITY ESTIMATES

EXHIBIT BV-04: CAPITAL STRUCTURE DATA

EXHIBIT BV-05: SUMMARY DATA ON SAMPLE AND ASU

I. INTRODUCTION AND SUMMARY

Q1. Please state your name, occupation and business address.

A. My name is Bente Villadsen and I am a Principal of The Brattle Group, whose business address is 44 Brattle St., Cambridge, MA 02138.

Q2. Please summarize your professional qualifications.

A. I have more than 16 years of experience working with regulated utilities on cost of capital and related matters. My practice focuses on cost of capital, regulatory finance and accounting issues. I have testified or filed expert reports on cost of capital in Alaska, Arizona, California, New Mexico, Oregon as well as before the Bonneville Power Administration, the Surface Transportation Board, and the Alberta Utilities Commission. I have provided white papers on cost of capital to the British Columbia Utilities Commission, the Canadian Transportation Agency as well as to European and Australian regulators on cost of capital. I have testified or filed testimony on regulatory accounting issues before the Federal Energy Regulatory Commission (FERC), the Michigan Public Service Commission as well as in international and U.S. arbitrations and regularly provide advice to utilities on regulatory matters as well as risk management. I have previously testified on cost of capital before the Regulatory Commission of Alaska (Commission or RCA). I hold a Ph.D. from Yale University and a BS/MS from University of Aarhus, Denmark. Exhibit BV-01 contains more information on my professional qualifications as well as a list of my prior testimonies.

Q3. Please summarize your testimony.

A. Anchorage Water and Wastewater Utility (AWWU) has asked me to determine the cost of equity and fair rates of return on equity for its Anchorage Wastewater Utility (ASU) division in connection with ASU's request for an increase in its rates. As only ASU is seeking to change rates, my focus is on the wastewater business of AWWU. Because ASU as of year-end 2015 and going forward is expected to have a capital structure that is substantially more leveraged than the average water utility, I recommend that ASU's rates be determined using a hypothetical capital structure. Specifically, I recommend that the average book capital structure of the water utilities I consider in my comparable sample be used to benchmark the capital structure used to regulate ASU.

I selected a sample of water utilities that are subject to regulation and reviewed the average and median capital structure as of Q1 2016 and over the most recent five year period. The average and median equity percentage as of Q1 2016 was 53% while the five year average was about 51%.[1] I therefore recommend the same equity percentage as in ASU's most recent rate application, U-13-202. At that time, ASU applied to use 52% equity for regulatory purposes. Because 52% equity remains consistent with the average experienced for water utilities, I recommend using a hypothetical capital structure with 52% equity in this case, which will allow ASU on a stand-alone basis to have metrics that are comparable to those of other utilities.

I calculated the cost of equity for the sample using standard models and methods such as the Capital Asset Pricing Models (CAPM), Discounted Cash Flow (DCF) models and a risk premium model. Having estimated the cost of equity for the sample, I then

[1] Exhibit BV-04.

considered specific risks of ASU to derive a range of cost of equity estimates for the ASU. I concluded that a range of reasonable return on equity (ROE) estimates for a generic water and wastewater utility with 52% equity is as indicated below.[2] Because publicly traded water companies engage in regulated activities in both the water and wastewater industry, I consider the group comparable to ASU. I also recommend an ROE for ASU:[3]

Return on Equity

	Reasonable Range for Proxy Group
CAPM-Based Methods	9½% - 10¾%
DCF-Based Methods	8½% - 11¼%
Risk Premium	10%
Recommended ROE for ASU	**10¼%**

Based on my estimates' results, a reasonable return for wastewater utilities is in the range of 9½% to 10¾%. While the midpoint of the range above is about 10 percent, I consider ASU to be of higher risk than the average sample company, so that it should be placed in the upper half of the range due to its smaller size, high level of Contributions in Aid of Construction (CIAC) and large capex program. I therefore recommend an ROE of 10.25%. Further, the Commission has in the past assigned primary weight to the single-stage DCF, which results in an ROE of 11.3%, and lesser weight to the CAPM, which results in ROE estimates of 9.4% to 10.3%. A 60% weighting of the single-stage DCF

[2] I select my water and wastewater utility sample from Value Line's Water Utility group, which included companies in the water and wastewater industry. All sample companies engage in both water and wastewater activities.

[3] These ranges exclude outliers and are rounded relative to the actual estimates.

would result in an ROE of at least 10.4%.[4] Therefore, my recommendation is consistent with the Commission's relative weighting of the DCF and CAPM in Order 10. I discuss the details of my analysis of ASU-specific later in my testimony.

II. APPROACH TO ESTIMATING THE COST OF CAPITAL

A. PRELIMINARY COMMENTS

Q4. What are the guiding principles for determining a just and reasonable rate of return on utility investments?

A. Fortunately, there has been a lot of guidance provided on this topic over the years. Perhaps the seminal guidance was provided by the U.S. Supreme Court in the Hope and Bluefield cases, which found that:[5]

1. The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks;[6]

2. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility; and

3. The return should be adequate, under efficient and economical management for the utility to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[7]

---

[4] Assigning a weight of 60% to the single-stage DCF estimate of 11.3%, and 40% weight to the CAPM estimates of 9.4% to 10.3%, results in an ROE of 10.4% to 10.9%. *See* Regulatory Commission of Alaska (RCA) Order No. 10 in dockets U-08-157 and U-08-158 dated March 1, 2010, at p. 44.

[5] *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia*, 262 U.S. 679 (1923) (Bluefield), and *Federal Power Com'n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944) (Hope).

[6] *Hope*.

Q5. Please describe how you conducted your cost of equity analysis.

A. I selected a sample of regulated water utilities that are comparable to AWWU, estimated the return that investors required to provide capital for those utilities and reviewed the return on equity authorized in other jurisdictions. I also reviewed the specific risks for ASU including business, financial, and regulatory risk. I discuss the Water Utility Sample in detail later on in my testimony.

In order to provide additional support for my recommendation, I undertake several analyses. Specifically, I use the CAPM, DCF and Risk Premium analyses; all of which are widely used in the utility and ratemaking setting. The wisdom of employing multiple methodologies has been acknowledged by the Commission in prior decisions.[8]

To arrive at my final ROE recommendation, I considered (i) the ranges of my cost of equity numbers, (ii) the current economic outlook, (iii) the financial risk differences between ASU and the sample, (iv) the business risks of ASU relative to that of the benchmark samples, (v) the regulatory environment in which AWWU operates. The analyses or assessments I undertook to arrive at my final ROE recommendation is discussed below. Based upon my analyses of the factors noted above, I determined that a reasonable ROE for ASU is 10.25% if regulated using a hypothetical capital structure including 52% equity.

1. Cost of Capital and Risk

Q6. How is the "cost of capital" defined?

---

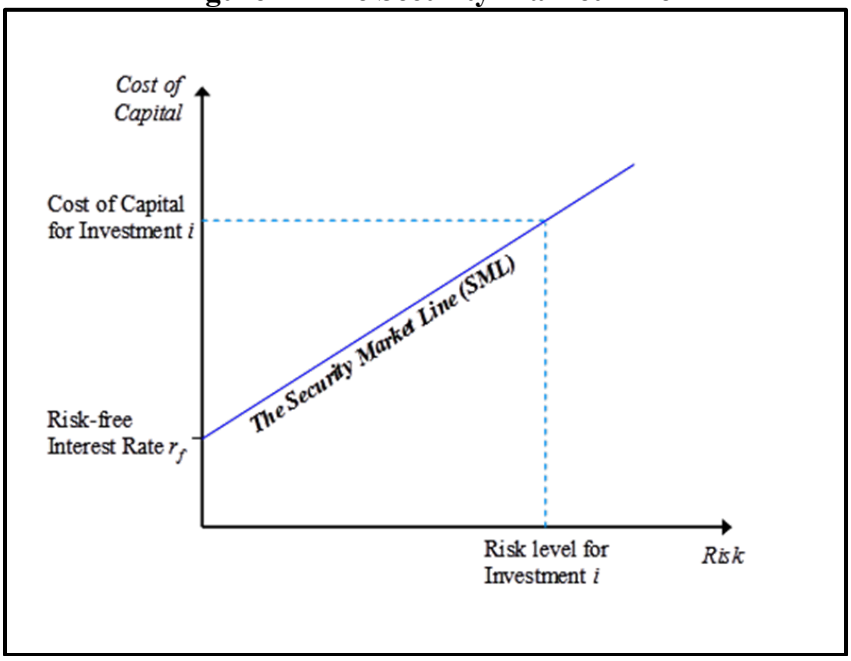
[7] *Bluefield*.

[8] See RCA Order No. 10, Order Resolving Revenue Requirement Issues, in dockets U-08-158 and U-08-159, p. 33.

A. The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of possible outcomes. The terms "expect" and "expected," as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

The definition of the cost of capital recognizes a tradeoff between risk and return that can be represented by the "security market risk-return line" or "Security Market Line" for short. This line is depicted in Figure 1 below. The higher the risk, the higher the cost of capital required.

Figure 1: The Security Market Line



Q7. Why is the cost of capital relevant in utility rate regulation?

A. The "cost of capital" for rate regulation purposes is the return that utility investors expect to earn on investments of comparable risk[9] and is one of the relevant factors set forth in the Hope and Bluefield cases.

Q8. What does this mean from an economic perspective?

A. From an economic perspective, rate levels that give investors a fair opportunity to earn the cost of capital are the lowest levels that compensate investors for the risks they bear. A utility's ability to attract capital and maintain its financial integrity requires that the combined equity return and equity ratio be such that not only is the expected return commensurate with that of other enterprises, but it also meets the expectations of credit market participants.

More important for customers, however, are the broader economic consequences of providing an inadequate return to the company's investors. In the short run, deviations from the expected rate of return on the rate base from the cost of capital may seemingly create a "zero-sum game"—investors gain if customers are overcharged, and customers gain if investors are shortchanged. In the longer term, inadequate returns are likely to cost customers—and society generally—far more than may be saved in the short run. Inadequate returns lead to inadequate investment, whether for maintenance or for new plant and equipment. Without access to investor capital, the company may be forced to forgo opportunities to decrease its costs through timely maintenance, upgrading, and expanding of its systems and facilities. Indeed, the cost to consumers of an undercapitalized industry can be far greater than any short-run gains from shortfalls in the cost of capital. This is especially true in capital-intensive industries (such as the water,

[9] See Stewart C. Myers, "The Application of Finance Theory to Public Utility Rate Cases," *The Bell Journal of Economics & Management Science* 3:58-97 (1972).

electric and gas utility industry), which feature systems that take time to decay. Such long-lived infrastructure assets cannot be repaired or replaced overnight, because of the time necessary to plan and construct the facilities. Thus, it is in customers' interest not only to make sure the expected return of the investors does not exceed the cost of capital, but also that the expected return does not fall short of the cost of capital. Details on infrastructure assets and needed investments are discussed in the testimonies of Stephen Nuss, P.E., AWWU Engineering Division Director and Glenda Gibson, CFO, AWWU Finance Division Director.

2. The Impact of Risk on the Cost of Capital

Q9. Please summarize how you factored risk when determining the cost of capital.

A. I analyzed the difference in leverage among the sample utilities and the regulatory capital structure of ASU. To determine where in the estimated range ASU's ROE reasonably falls, I compared the business risk of ASU to that of the sample utilities and also considered recent capital market developments.

Q10. Why is capital structure important for the determination of the cost of equity?

A. Owners of a company with more debt face more equity risk and therefore the return on equity needs to be greater.[10] This is irrespective of the ownership structure. In liquidation, debt holders are paid prior to owners, therefore debt increases risk for the residual claimants / owners. There are several manners in which the impact of financial risk can be taken into account in an analysis of cost of equity. One way is to determine the after-tax weighted-average cost of capital for the entities and let that figure be

[10] Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporate Finance," *The Journal of Finance* 24: 13-31 (March 1969).

constant between the estimate obtained for the sample and the entity to which it is applied. This assumes that the after-tax weighted-average cost of capital is constant for a range that spans the capital structures used to estimate the cost of equity and the regulatory capital structure.[11] A second approach was developed by Professor Hamada, who unlevered the beta estimates in the CAPM to obtain a so-called all-equity or assets beta and then re-levered the beta to determine the beta associated with the target regulatory capital structure. This requires an estimate of the systematic risk associated with debt (i.e., the debt beta), which is usually quite small. In Exhibit BV-02, I set forth additional technical details related to methods to account for financial risk when estimating the cost of capital.

Q11. Why is a hypothetical capital structure merited?

A. ASU's actual capital structure includes 67% debt,[12] which is unusually high and higher than that of any of the comparable companies by more than 10 percentage points. Because the cost of equity depends on the capital structure as discussed above, it is therefore necessary that ASU either be allowed a "normalized" hypothetical capital structure for ratemaking purposes or an unusually high ROE to ensure ASU has an opportunity to earn a reasonable return on equity and the ability to maintain a revenue bond coverage that allows ASU to pay interest and principal on a timely schedule.[13] It is not uncommon in situations where the capital structure of the regulated utility deviates from that of the industry to allow the use of a hypothetical capital structure for ratemaking purposes. The Commission has in the past acknowledged that a hypothetical

[11] See also the discussion in Jonathan Berk & Peter DeMarzo, "*Corporate Finance*," 3rd Edition, 2014, p. 490.

[12] Ms. Gibson Pre-filed Testimony at 30-32 and Exhibit GJG-01 Page 60.

[13] Gibson Pre-filed Direct Testimony at 17. .

capital structure may have merit if the book capital structure is unreasonable or exposes the utility to excessive risk.[14] In the prevailing case, ASU's book capital structure is outside of the range of what, for example, Moody's considers reasonable for an A rating.[15] As explained in Ms. Gibson's testimony, Fitch in its July 2016 rating review of ASU's bonds noted that ASU's debt level is above average.[16]

Q12. Would your ROE recommendation change if ASU's actual capital structure were to be used for ratemaking purposes?

A. Yes. It is a common first step for cost of capital experts to rely on a sample of comparable companies to estimate the cost of equity for companies with comparable business risks. However, this is only the first step in determining the cost of equity for a specific company, because any one company may face larger business, financial, or regulatory risks than the sample. Step two is therefore an assessment of the risk associated with the target entity – ASU. Therefore if ASU has less equity than the sample, an ROE adjustment needs to be made for the added risk in ASU's capital structure, so that using ASU's actual capital structure, which included approximately 67% debt, would require an ROE increase of more than 400 basis points. It is important to keep in mind that the cost to customers is the allowed dollar return on equity plus the cost of debt, so that if we ignore taxes, the example below illustrates this. The cost to

[14] For example, RCA Order No. 22 in dockets U-13-184/U-15-096/U-15-097 re Anchorage Municipal Light and Power (April 3, 2015) at p. 51 notes that the Commission "use[s] a hypothetical capital structure when (1) the actual capital structure is inefficient or unreasonable, (2) the level of debt subjects the utility to excessive risks, or (3) the utility is part of a holding company system in which the utility's book capitalization and capital costs are not a true reflection of the system's capital costs with respect to the utility."

[15] Moody's, "Global Regulated Water Utilities," December 2009, p. 22.

[16] Gibson Testimony Q58.

customers would be the same for (A) a hypothetical capital structure of 52% equity with an ROE of 10.25%, or (B) an actual capital structure of 33% equity with an ROE of 12.3%. Scenario A is simply more in line with what is commonly allowed.

Example illustrating Customer Cost Associated with Cost of Capital

	Scenario A	Scenario B
Equity Percentage	52%	33%
Rate Base	$1,000	$1,000
Allowed ROE	10.25%	13.27%
Cost of Debt	5%	5%
Cost to Customers	$77.30	$77.30

Note: The rate base and cost of debt were chosen for illustrative purposes and does not reflect ASU's current rate base or cost of debt.

Because the cost of equity depends on what capital structure is used, and because ASU's actual capital structure includes an amount of debt that exposes ASU to an excessive amount of financial risk, I recommend a hypothetical capital structure be used.

Q13. Please identify the ASU-specific risk factors.

A. First, while there is no market capitalization available for AWWU, the book value of total assets was approximately $443 million for ASU at year-end 2015.[17] In comparison, the average and median of total asset for the sample at year-end 2015 exceeds $3.6 billion and $1.3 billion, respectively. Similarly, looking at the book equity among the sample

[17] Exhibit GJG-01 at 18.

companies the average and median was $1.1 billion and $425 million at year-end 2015, whereas ASU had only $81.5 million.[18] Thus, ASU is smaller than the average / median sample company. Second, ASU has not achieved its allowed return on equity. Even ASU and AWU together are smaller than the average / median company.

ASU has earned returns of 4.89% to 10.53% each year between 2011 and 2015.[19] I understand that the Commission has adopted regulations that may help offset some regulatory lag pertaining to certain types of infrastructure investments.[20]

Third, ASU has a very large portion of its assets financed by CIAC.[21] The presence of a large CIAC has two effects. As ASU does not earn a return on these funds, it has larger than usual operating risks; in essence, the utility is responsible for fixed costs over and above what it earns a return on. Therefore, the exposure to asset-related risks is larger than what is reflected in the rate making process. Further, as the CIAC funded assets are being replaced by utility funded assets, the utilities faces financing risks. This effect is especially large for ASU, which has a higher ratio of CIAC to net Property, Plant and Equipment (PPE) and of CIAC to long-term debt than the sample. Among the sample companies only California Water has a comparable CIAC to debt ratio, but California Water has less net PPE to assets than the other sample companies and ASU.[22]

---

[18] Exhibit BV-05.

[19] Gibson Testimony Q47.

[20] 3 AAC 52 Amendment: Article 9. Plant Replacement and Improvement Surcharge Mechanism (PRISM), June 29, 2014 (http://aws.state.ak.us/OnlinePublicNotices/Notices/Attachment.aspx?id=95760) (Article 9)

[21] Exhibit GJG-01 at 43.

[22] Exhibit BV-05.

Third, assuming ASU will be allowed a hypothetical capital structure of 52% equity, it nonetheless carries more financial risk than what is inherent in the CAPM and DCF cost of equity estimates. Because the CAPM and DCF models use data from capital markets to estimate the return on equity that investors require, the data entered the calculation are market data – e.g., the total return to investors (changes in stock prices plus dividends) relative to the investment made. The investment is the dollar value of equity and debt, so the market value of equity and debt is what matters, when measuring the capital structure inherent in the CAPM and DCF based estimates of the cost of equity. Over the last five years, the average utility in my water sample has had approximately 64% equity in their capital structure, when measured at market value.[23]

Q14. Please discuss the impact of ASU being small in size.

A. The size of ASU is such that it plausibly falls in the micro or small category as defined by Duff & Phelps.[24] Empirically, investors have required a higher premium to invest in smaller companies than in larger ones. For example, Duff & Phelps data indicates that micro-cap companies on average have a return on equity that is 0.8% higher than that of small-cap companies.[25] Therefore, empirical evidence suggests that investors in micro-cap companies require a higher return than do investors in larger companies. As some of the companies relied upon to assess the sample's cost of equity also are micro-cap, an adjustment of a portion of the empirical difference between micro and small-cap

[23] I note that I measure both equity and debt at market value. See, Table No. BV-Water 3.

[24] Duff & Phelps 2015 Classis Yearbook p. 108.

[25] Duff & Phelps, 2015 Classis Yearbook, pp. 108-109. I note that Duff & Phelps look to the market capitalization of the companies. Therefore, the reliance on the Duff & Phelps small company risk premium implicitly assumes that the ASU's assets have a market value that is comparable to that of the sample companies.

companies is reasonable. *I.e.*, an adjustment of upward 40-50 basis points to a raw cost of equity estimate is reasonable.

Q15. Are there other differences between the environments in which the sample companies and ASU operate?

A. Yes. ASU's operations are concentrated in Anchorage and the surrounding area, which due to its location creates some unique challenges in, for example, construction due to weather. Further, while ASU's service territory is concentrated in one area of one state, larger water and wastewater companies such as American Water Works and Aqua America operate in multiple states. For example, American Water Works has utility operations in 16 U.S. States,[26] while Aqua America has utility operations in 8 U.S. states.[27] Other sample companies have utility operations in the lower 48 states,[28] so that the sample is much more geographically diverse than is ASU.

Q16. What are the implications of ASU being unable to earn their allowed ROE?

A. As shown in Figure 2, ASU has on average not earned the allowed ROE over a number of years.

[26] http://amwater.com/about-us/our-states.html

[27] https://www.aquaamerica.com/our-states/our-states-overview.aspx

[28] American States Water, California Water Services, and SJW Corp. operate water and wastewater utilities in California. Connecticut Water operates a water and wastewater utility in Connecticut, Middlesex Water operates a water and wastewater utility in New Jersey, and York Water operates a water and wastewater utility in Pennsylvania.

Figure 2: ASU Earned Return

		Year				
		2015	2014	2013	2012	2011
Historical Return on Equity	[a]	7.13%	9.98%	10.53%	9.50%	4.89%
Alllowed Return on Equity	[b]	10.90%	10.90%	11.10%	11.60%	12.10%

Sources/Notes:
[a]: ASU 2015 Annual Report, page 54.
[b]: U-10-102(14), Letter Order L1100636, Letter Order L1200756, U-13-202, which stipulated the last adjudicated ROR from U-08-158.[29]

This indicates that there has been an asymmetry between over- and under-earning. I.e., ASU could not expect to earn its allowed ROE on average. Thus, if the allowed ROE is set at the utility's fair cost of capital, it cannot expect to earn it. Because the investment in fixed assets needs to be used and useful before the utility can recover capital cost, a utility that engages in capital expenditures necessarily faces a lag in the recovery of capital costs. This is the case for ASU. While PRISM allows the earlier recovery of certain horizontal asset investment, capital spending related to treatment plants is excluded from recovery under PRISM. I understand that of the $36 million of plant put in service for ASU in 2015, AWWU estimates approximately 25% would be eligible for recovery through the PRISM surcharge.[30]

Q17. Please summarize the impact of a large CIAC amount on ASU's risk.

A. Exhibit BV- 05 summarizes the CIAC among the sample companies as well as for ASU. As can be seen from Exhibit BV-05, ASU has a ratio of CIAC to net Property, Plant and Equipment of 44% while the sample average and median is 16% and 11%, respectively. Similarly, if measured against other types of funding such as long-term debt, the sample

[29] In U-13-202 an ROE of 10.90% was sought on a hypothetical capital structure including 52% equity.

[30] Bell Pre-filed Direct at 44.

companies have an average (median) CIAC to long-term debt ratio of 41% (36%), while ASU's CIAC to long-term debt ratio exceeds 100%.

Because CIAC has been used to finance long-lived assets that are operated by ASU, but ASU earns no return on those assets, the magnitude of ASU's CIAC impacts its financial performance. The presence of fixed assets increases operating leverage, because these assets still need maintenance etc., but the revenue associated with the contributed assets does not include a return. Hence, the level of fixed costs to revenue is larger than what it would have been without so much CIAC and therefore operating leverage is increased. Operating leverage (like financial leverage) exposes the utility to risk.

Q18. What about ASU having a higher bond rating than the comparable companies?

A. First, I note that the sample utilities on average have a bond rating of about A. Thus, ASU and the sample companies all have a bond rating well above the investment grade level. This is important because neither AA, A nor BBB rated companies have much default risk.[31] Second, bond ratings are measures of default risk. Thus, the bond rating is the risk of default to the bonded debt only, not all debt. For example, it does not apply to the State of Alaska loan debt or any general debt of the utility to its vendors. The bonded debt is akin to secured versus unsecured debt and gets paid before the non-bonded debt, having a claim to the revenue ahead of any subordinated or other unsecured debt. Neither does it apply to equity holders, who are last in line. The risk profile as an equity holder looks much different than it does to a bonded debt holder and the bond rating says little

[31] According to Standard & Poor, "2014 Annual Global Corporate Default Study and Rating Transition," April 30, 2015, p 9 the default rate for AA and A rated corporate entities has been zero since 2009 while BBB rated entities saw a single year (2011) with a default rate of 0.07%, which is miniscule.

about how the risks look from the bottom of the payment waterfall. A better measure of the risk of a company's equity is its beta measure, not its bond rating.

For these reasons, there is no argument that the bond rating of ASU makes its **equity** any more or less risky than the sample companies.

III. IMPACT OF THE ECONOMY AND MARKETS ON THE COST OF EQUITY

A. INTEREST RATES

Q19. How do interest rates affect the cost of equity?

A. Interest rates and the developments in interest rates are important for the determination of the cost of equity for several reasons. First, current or forecasted interest rates are inputs to some commonly used cost of equity estimation methods such as the Capital Asset Pricing Model and the Risk Premium Model. Second, the developments in interest rates impact parameters or the interpretation of parameters that are often used in cost of equity estimation models. Economists often work with yields, which measures the return an investor realized on a bond – for example, the current yield is the annual interest divided by the current price of the bond. The yield on a bond generally increases if the bond has a longer time to maturity and/or if it has higher default risk, but investor perception also matters. If the difference between the yield on, for example, utility bonds and government bonds increases, it could be because (i) the risk characteristics of one of the bonds has changed or (ii) investors require a higher premium to hold non-government bonds.

Q20. What are the relevant developments regarding interest rates?

A. Recent interest rates and especially government bond yields have been low. However, the spread between utility bond yields and government bond yields of the same maturity

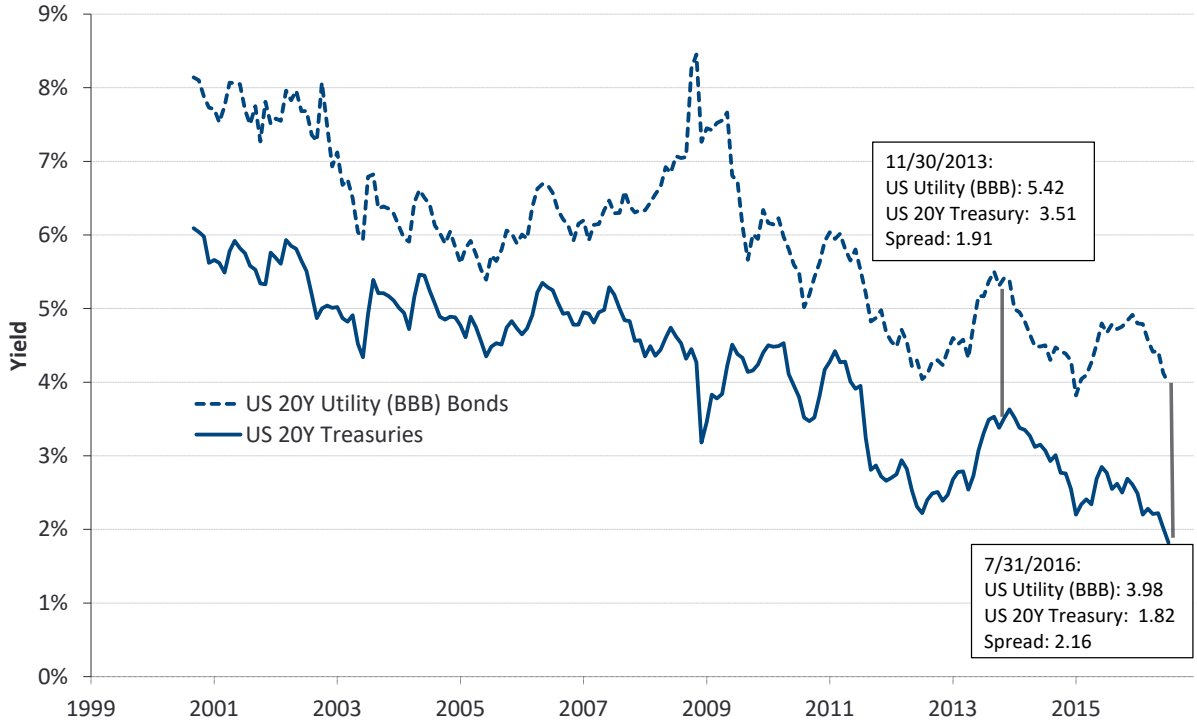
is higher than they have been historically; both when measured over the long run and more recently.

Figure 3 below shows the development in BBB rated utility and Government bond yields from 2000 to today.[32] It is evident that the yield spread (the difference between the yield on BBB rated utility bonds and government bonds) has increased both relative to its historical average and relative to the Company's most recent rate case filing (U-13-201/202).

Figure 4 shows the spread between A rated utility bonds and government bond yields along with the average spread prior to the financial crisis. Again, it is evident that the spread is greater. Thus, a review of both BBB rated and A rated bonds clearly illustrates the increase in the spread between the utility bond yield and government bond yields.

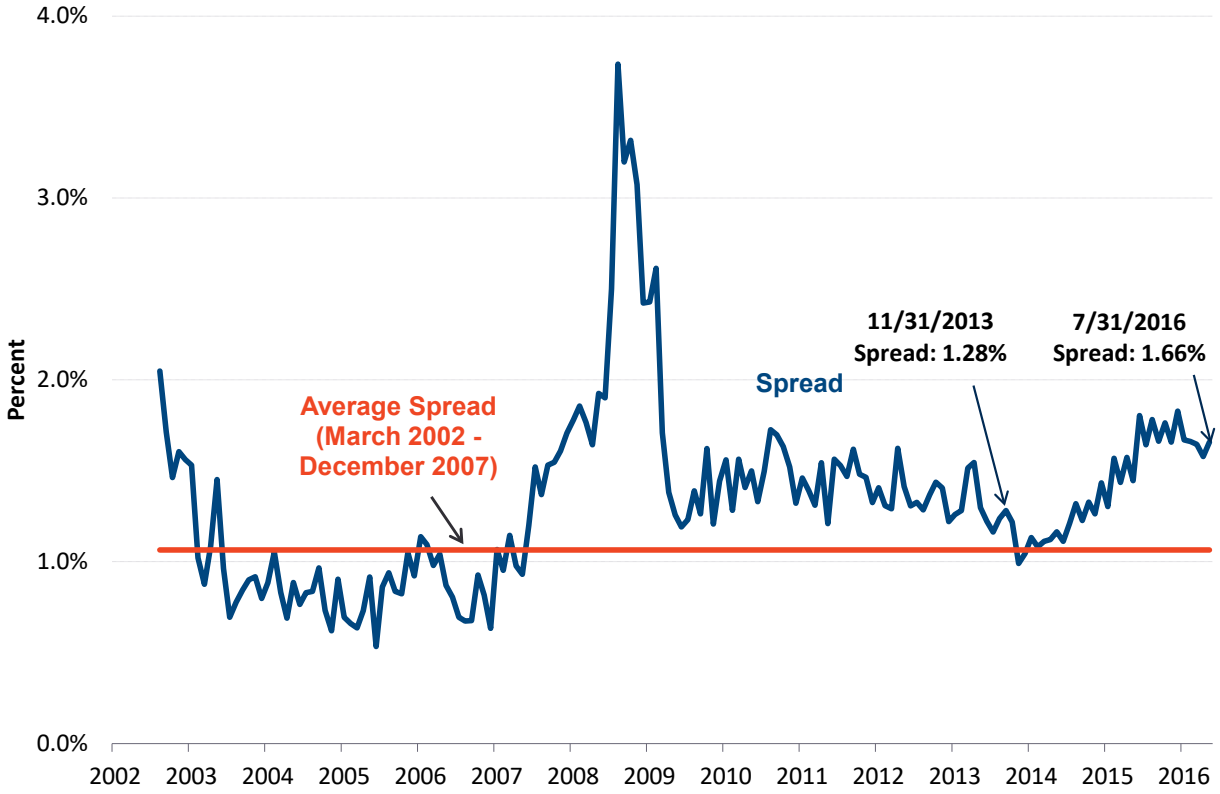
[32] For clarity "BBB rated" refer to bonds in the range of BBB- through BBB+ and "A rated" reference bonds in the range of A- through A+. The majority of water utilities are in the A range rating.

Figure 3: BBB Utility and Government Bond Yields



Source: Bloomberg

Figure 4: Spread between A Rated Utility and 20-Year Government Bond Yield



Source: Bloomberg.

Q21. How does the current spread between utility and government bond yields compare to the historical spread?

A. As shown in Figure 3 and Figure 4 above, the spread between BBB rated utility bond yields or between A rated utility bond yields and government bond yields has increased. At July, 2016 the BBB spread stood at 2.16%, which is approximately 100 basis points higher than prior to the 2008-09 financial crisis. At the same time the A rated utility bond spread was 1.66% for an increase of about 75 basis points over the pre-crisis level. Not only is the yield spread increased relative to its pre-crisis levels, but it is also greater relative to the level in the more recent past as illustrated in the figures above. (*See Exhibit BV-02,* Figure BV 2-1 *for details*).

Q22. How are interest rates expected to trend going forward?

A. Blue Chip Economic Indicators expects that the yield on 10-year Treasury Notes will increase by about 134 basis points by 2017 and the publication forecasts addition increases for 2018 and beyond.[33] Comparably, Consensus Forecast expects the 10-year yield to increase by 80 basis points by mid-2017.[34] These expectations are consistent with the current downward pressure on Government bond yields, which has largely been caused by the Federal Reserve's quantitative easing program and general stimuli of the U.S. economy.[35]

Q23. How do these developments impact the cost of equity analysis?

A. There are several ways in which the current interest rate environment affects the cost of equity analysis. First and most directly, the CAPM utilizes as one of its inputs a measure of the risk-free rate (see Figure 1). I used the yield on a 20-year US government bond as a proxy for the risk-free rate. The CAPM estimated the cost of equity as the risk-free or government bond rate plus a premium. Therefore, if the risk-free rate increases (decreases) by 1%, then the cost of equity increases (decreases) by 1%. As a result, to the extent that the government bond rate is driven by monetary policy rather than market factors, so is the CAPM estimate. Importantly, if the government bond rate is downward (upward) biased, then the CAPM estimate will be downward (upward) biased. When that is the case, it is necessary to normalize the relied upon government bond rate, so that the resulting CAPM estimate reflects a non-biased government bond rate. I consider this effect in my CAPM analysis.

---

[33] Blue Chip Economic Indicators, March 2016 and June, 2016.

[34] Consensus Forecasts, July 10, 2016.

[35] For a summary of the magnitude of the Federal Reserve's purchase program, see, for example, Bloomberg, "The Fed Eases Off," September 16, 2015.

Second and as a further indication of a potential bias, if the spread between the yield on utility (or corporate) bonds and government bonds (the "yield spread") widens, it indicates that the premium that investors require for holding securities other than government bonds has increased. Thus, there is evidence that the market equity risk premium has increased. A higher than normal yield spread is one indication of the higher risk premiums currently prevailing in capital markets. Investors consider a risk-return tradeoff (like the one displayed in Figure 1 above) and select investments based upon the desired level of risk. Higher yield spreads reflect the fact that the return on corporate debt is higher relative to government bond yields than is normally the case, even for regulated utilities. Because equity is more risky than debt, this means that the spread between the cost of equity and government bond yields must also be higher; i.e., the premium required to hold equity (the Market Risk Premium or MRP) rather than government bonds has increased. If this fact is not recognized, then the traditional cost of capital estimation models will underestimate the cost of capital prevailing in the capital markets. My analyses recognize this effect and therefore reflect the cost of equity capital more accurately.

Third, in times of economic uncertainty (such as the present) investors seek to reduce their exposure to market risk. This precipitates a so-called "flight to safety," wherein demand for low-risk government bonds rises at the expense of demand for stocks. If yields on bonds are extraordinarily low, however, any investor seeking a higher expected return must choose alternative investments such as stocks, real estate, gold or collectibles. Of course, all of these investments are riskier than government bonds, and investors demand a risk premium (perhaps an especially high one in times of economic uncertainty) for investing in them. But short of accepting meager returns, investors simply have few alternatives to returning to the stock market. Utility stocks may have

experienced the "flight to safety" phenomenon to a larger degree than other stock because they traditionally have paid a substantial portion of their earnings as dividends. Therefore, investors who have sought income from their investments and found government bonds too unattractive may have accepted a higher risk and invested in utility stock with the goal of receiving periodic dividend payments. Importantly, if utility stock prices increase, the dividend yield decline and cost of equity estimates from the Discounted Cash Flow (DCF) model will, everything else equal, be lower. I discuss the potential impact in Section III.B below.

One possible explanation of the current elevated level of the yield spread is that current and near-term expected levels of government bond yields are artificially depressed due to monetary policy.[36] I emphasize that the U.S. government bond yields (as well as that of many other western countries) is expected to increase substantially over the next several years.[37]

Q24. What are the implications of elevated yield spreads to the cost of equity?

A. The increase in the yield spread indicates that (i) the current long-term government bond yields are depressed relative to their normal levels and / or (ii) investors are demanding a premium higher than the historical premium to hold securities that are not risk free. The latter is an indication that the market equity risk premium may be elevated relative to its historical level. Regardless of the interpretation, the consequence is that if cost of equity

[36] As of year-end 2014, the Federal Reserve held approximately $1.8 trillion of mortgage-backed securities, whereas the magnitude was less than $0.5 trillion in mid-2009. Source: Bloomberg, "The Fed Eases Off," September 16, 2015.

[37] If investors' believe the yield on government bonds will soon elevate, they may demand higher yields on corporate debt relative to the prevailing government bond yields, thus widening the yield spread.

is estimated using the current risk-free rate and a market equity risk premium based on historical data, then it will be downward biased. Hence, it is necessary to "normalize" the risk-free rate **or** take into account the current (rather than historical) market equity risk premium.[38]

B. MARKET VOLATILITY AND OTHER MARKET PHENOMENA

Q25. How did you factor the stock market's volatility into your analysis?

A. I considered the effect of market volatility on the risk premium investors require to hold equity rather than government debt and I also considered the impact the unusually low interest rates may have on the current dividend yield.

Q26. Please explain how market volatility impacts investors' required return on equity.

A. Academic research has found that investors expect a higher risk premium during more volatile periods. The higher the risk premium, the higher the required return on equity. For example, French, Schwert & Stambaugh (1987) found a positive relationship between the expected market risk premium (MRP) and volatility:

> We find evidence that the expected market risk premium (the expected return on a stock portfolio minus the Treasury bill yield) is positively related to the predictable volatility of stock returns. There is also evidence that unexpected stock returns are negatively related to the unexpected

[38] I note that if a combination interpretation is used, it becomes important to make sure that the overall (total) "normalization" takes into account the elevated yield spread once and only once. I therefore consider two scenarios in my CAPM analysis. In Scenario I, the risk-free rate is increased by the abnormal increase in the yield-spread to take into account the elevated yield spread. This scenario is consistent with the interpretation that the current government bond yield is artificially downward suppressed. In Scenario II, the MRP is increased by an amount that is consistent with the interpretation that the increase in the yield spread is due to an increase in the premium investors require to hold assets other than those that are risk-free. Importantly, I use the historical MRP in Scenario I and the 2017 forecast risk-free rate in Scenario II, so that no scenario considers allows for both a normalization of the risk-free rate and an increase in the MRP.

> change in the volatility of stock returns. This negative relation provides indirect evidence of a positive relation between expected risk premiums and volatility.[39]

One implication of this finding is that the MRP tends to increase when market volatility is high, even when investors' level of risk aversion remains unchanged.

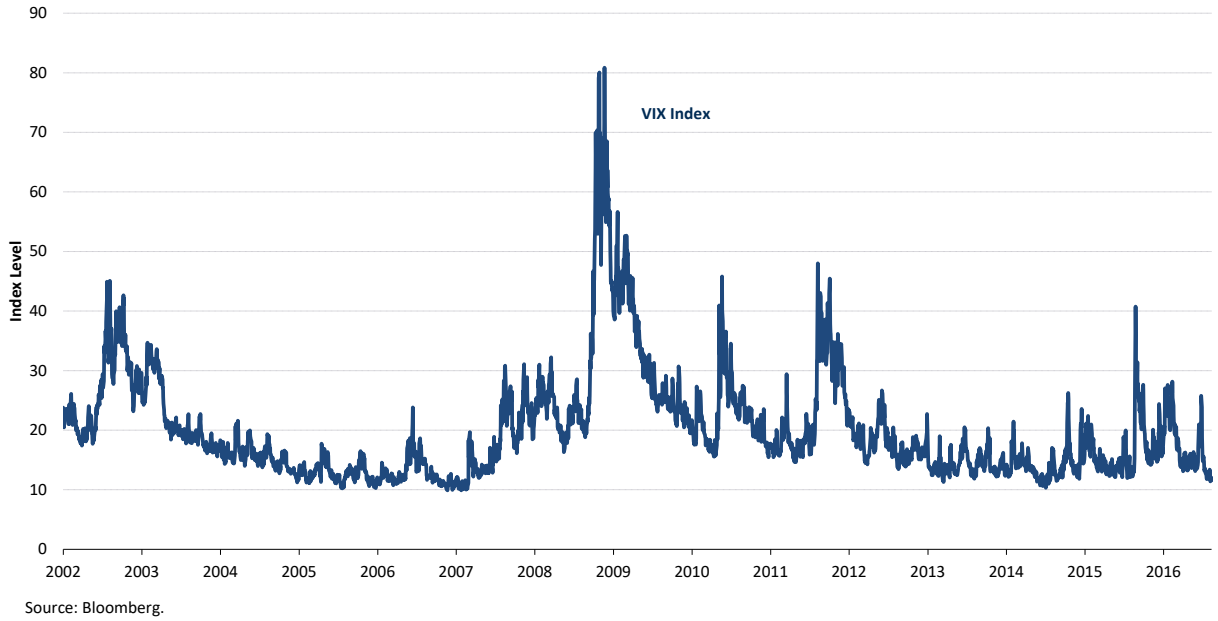
A measure of the market's expectations for volatility is the VIX index, which measures the 30-day implied volatility of the S&P 500 index.[40] These indices are also referenced as the "market's fear gauge."[41] While the long-term average for the VIX is about 20, the current level of about 12 is somewhat below its long-term average although it was elevated for extensive periods in 2016.

[39] K. French, W. Schwert and R. Stambaugh (1987), "Expected Stock Returns and Volatility," *Journal of Financial Economics*, Vol. 19, p. 3.

[40] See, for example, Chicago Board Option Exchange at http://www.cboe.com/micro/VIX/vixintro.aspx

[41] CNBC, "VIX, the Market's Fear Gauge Plunges in Historic One-Week Move," July 5, 2016.

Figure 5: Volatility Index



Source: Bloomberg.

Q27. What do you mean by the term "risk aversion"?

A. Risk aversion is the recognition that investors dislike risk, which means that for any given level of risk, investors must expect to earn an appropriate return to be induced to invest. An increase in risk aversion means that investors now require a higher return for that same level of risk.

Q28. Do you have any evidence that the return premium demanded by investors for taking risk is higher than it was prior to the 2008-09 financial crisis?

A. Yes. Looking to forecasted MRPs, both academic research and financial data services such as Bloomberg have found an increase in the expected MRP compared to prior to the financial crisis. Not only did the expected MRP increase but it remains above the historical level. For example, Bloomberg's expected MRP exceeds the historical average

MRP and currently stands at about 7.95% over 10-year bonds, while the historical arithmetic average MRP from 1926 to 2015 was about 7%.[42]

Q29. Has the MRP increased since the 2008-09 financial crisis?

A. Yes. A recently updated analysis by Duarte and Rosa of the Federal Reserve of New York aggregates the results of many models of the required MRP in the U.S. and tracks them over time. This analysis finds a very high MRP in recent years.

The analysis estimates the MRP that results from a range of models each year from 1960 through the present.[43] The analysis then reports the average as well as the first principal component of results.[44] The analysis then finds that the models used to determine the risk premium are converging to provide more comparable estimates and that the average annual estimate of the MRP was at an all-time high in 2013. These estimates are reasonably consistent with those obtained from Bloomberg and the consistent elevation of the MRP over the historical figure indicates that the elevated level is persistent. Figure 6 below shows Duarte and Rosa's summary results.

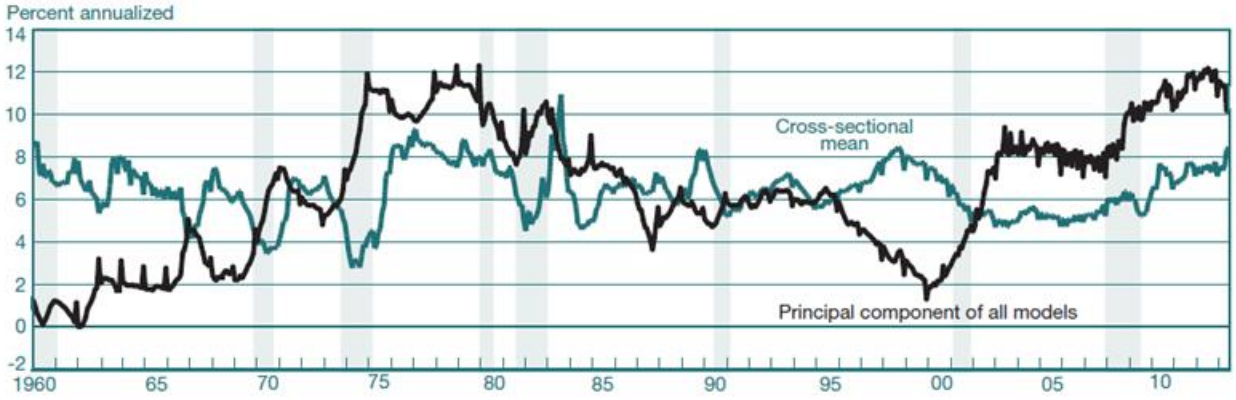
---

[42] Bloomberg and Duff & Phelps, "*2016 Valuation Handbook: Guide to Cost of Capital*," 2016.

[43] Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Review of Models*," Federal Reserve Bank of New York*, December 2015 (Duarte & Rosa 2015).

[44] Duarte & Rosa emphasize the "first principal component" of the 20 models. This means that the authors used statistics to compute the weighted average combination of the models that captures the most variability among the 20 models over time.

Figure 6
Duarte and Rosa's Chart 3
One-Year Ahead MERP and Cross-Sectional Mean of Models



Q30. Are there other reasons why capital markets may continue to exhibit high volatility?

A. Yes, the early part of 2016 saw very large market declines across the globe and trading on the Chinese market was halted. This was followed by large increases and another drop around the United Kingdom's vote to exit the European Union on June 23, 2016 (popularly labelled Brexit). Further, unrest in the Middle East has contributed to continued uncertainty and thereby an increase in the market equity risk premium that investors require. Lastly, it appears that the Euro zone once again may need to deal with the Greek debt situation.

Q31. Are there other features of financial markets that are currently unusual?

A. Yes. The current level of many companies, including water utilities, Price-to-Earnings (P/E) ratio is higher than what has been experienced historically. Empirically, the P/E ratio increases when interest rates decline. This effect is shown in Figure 7 below using water utilities' quarterly P/E ratios from 1991 to today.

Figure 7: Relationship Between Average Price / Earnings Ratio and **20-Year Treasury Bond Yield**

Source: Bloomberg (using quarterly data from 1990 through 2015)

Q32. Please explain the relationship between the P/E ratio and the 20-year government bond yield of interest in your analysis.

A. The dividend yield, which is calculated as Dividends divided by Price (D/P), is closely related to the P/E ratio as dividends are paid out of earnings. If the P/E ratio is very high (low), then the Earnings-to-Price ratio is low (high) and so is the dividend yield (D/P). The average water utility pays approximately 60% of its earnings as dividends, so if the P/E ratio increases from, for example, 20 to 22 (10%), then the Earnings / Price ratio declines by about 0.45% (from 5% to 4.55%) and the dividend yield declines by 0.27% (60% × 045%). Therefore, if the 20-year government bond yield is artificially depressed and expected to increase, then the dividend yield is also artificially depressed and

expected to increase. As a result, the results from the standard dividend discount models are likely to underestimate the cost of equity that will prevail going forward.

Q33. What do you conclude from this information?

A. The increase in the spread between the yield on utility and government bonds indicates that the premium investors require to hold assets that are not risk-free has increased. Likewise, the recent trends in preferred equity yields confirm that the premium on assets other than government bonds has increased. Similarly, the forecasted MRP is high relative to its historical average. These factors point to a relatively high degree of investor risk aversion and the premium that investors require to hold assets that are not risk-free is elevated. Similarly, the very low risk-free rate is likely to have led to higher P/E ratios due to the flight to quality discussed above and consequently lower than "normal" dividend yields.

C. IMPACT ON ROE ESTIMATION

Q34. Please summarize how the economic developments discussed above have affected the return on equity and debt that investors require.

A. Utilities rely on investors in capital markets to provide funding to support their capital expenditure program and efficient business operations. Investors consider the risk return tradeoff in choosing how to allocate their capital among different investment opportunities. It is therefore important to consider how investors view the current economic conditions; including the plausible development in the risk-free rate and the current MRP.

These investors have been dramatically affected by the credit crisis and ongoing market volatility, so there are reasons to believe that their risk aversion remains elevated relative to pre-crisis periods.

Likewise, the effects of the Federal Reserve's monetary policy have artificially lowered the risk-free rate. As a result, yield spreads on utility debt, including top-rated instruments, have remained elevated. The evidence presented above demonstrates that the equity risk premium is higher today than it was prior to the crisis for all non-risk-free investments. This is true even for investments of lower-than-average risk, such as the equity of regulated utilities.

Q35. Does your analysis consider the current economic conditions?

A. Yes. In implementing the CAPM and risk premium models, I considered two scenarios that consider the increased yield spread as being (i) a downward bias in the risk-free rate **or** (ii) an elevation of the MRP. Specifically, I relied on two sets of inputs for the CAPM: I consider the elevated spread between utility and government bond yields and either (i) normalize the risk-free rate to reflect the current downward bias of the yields and combine that with the historical MRP or (ii) rely on Blue Chip's 2017 government bond yield forecast for the risk-free rate and combine that with a MRP that reflects the strong evidence that risk premiums are elevated relative to their long-term historical average.[45] Similarly, I considered the impact on the dividend yield from the discussion above, which indicates that dividend yields will increase with increasing interest rates and hence will be higher going forward than they are today.

IV. ANALYZING THE COST OF EQUITY

A. APPROACH

Q36. Please outline your approach for determining the cost of equity for ASU.

[45] If the yield spread were to return to the level before the financial crisis, it would, everything else equal, be appropriate to consider the forecasted risk-free rate for the period during which rates will be in effect along with the historical average MRP.

A. As described above in Section II.A, the standard for establishing a fair rate of return on equity requires that a regulated utility be allowed to earn a return equivalent to what an investor could expect to earn on an alternative investment of equivalent risk. Therefore, my approach to estimating the cost of equity for ASU focuses on measuring the expected returns required by investors to invest in companies that face business and financial risks comparable to those faced by ASU. Because the models I rely upon most heavily require market data, my consideration of comparable companies is restricted to those that have publicly traded stock.

To this end, I have selected a sample of publicly-traded companies that primarily provide regulated water and wastewater services.

For this sample, I derive estimates of the representative cost of equity according to standard financial models including two versions of the CAPM and two versions of the DCF model. I further review summary analysis of allowed ROEs for water utilities. The latter analysis is conducted using allowed returns on equity and associated allowed equity ratios rather than market data; the results of these analyses are used as a test on the reasonableness of my market-based results.

As the cost of equity for the CAPM and DCF based models are derived from market data that reflect the capital that investors hold in the sample companies, I consider the impact of any difference between the financial risk inherent in the cost of equity estimates and the capital structure to which it is assigned using several methods to avoid any one method biasing the results.

B. SAMPLE SELECTION

Q37. How do you identify sample companies?

A. ASU is a regulated wastewater utility, so I start with the universe of publicly traded utilities classified as water utilities in Value Line. I require that the companies have an investment grade credit rating, no recent dividend cuts, and generally have data available for estimation.[46]

Q38. What are the characteristics of the Water Utility sample?

A. The water utility sample comprises water utilities whose primary source of revenues and majority of assets are subject to regulation. The final sample consists of the water utilities listed in Figure 8 below. These companies own regulated water and wastewater utility subsidiaries in many states. Therefore, the sample is broadly representative of the regulated water and wastewater industry from a business risk perspective.

Figure 8 reports the sample companies' annual revenues for the most recent four quarters as of Q2, 2016 and also report the market capitalization, credit rating, beta and growth rate. I note that compared to the sample companies included in Order 10, American Water Works has been added because it now has data available for analysis. At the time the data that led to Order 10 was obtained, American Water had just started trading and therefore had very limited market data available for analysis.[47]

[46] Commonly, I also eliminate companies with merger and acquisition activity as well as smaller entities with limited trading activity. However, there are only a limited number of companies available for analysis, so I do not use these criteria.

[47] I note that Pennichuck was acquired by the City of Nashua in 2011 and therefore is no longer part of Value Line's group of Water Utilities.

The sample consists of companies that Value Line classifies as water utilities except (i) Consolidated Water, which is a developer and operator of desalination plants rather than a utility, (ii) Global Water Resources, which does not have sufficient data available for analysis, and (iii) Artesian Water, which was excluded due to its concentrated ownership.

Figure 8

U.S. Water Sample

Company	Annual Revenues (USD million)	Regulated Assets	Market Cap. 2016 Q1 (USD million)	Betas	S&P Credit Rating (2016)	Long Term Growth Est.
	[3]	[4]	[5]	[6]	[7]	[8]
American States Water Co	$451	R	$1,446	0.70	A+	5.0%
American Water Works Co Inc	$3,204	R	$12,379	0.70	A	7.3%
Aqua America Inc	$816	R	$5,618	0.70	A+	6.3%
California Water Service Group	$588	R	$1,253	0.75	A+	9.7%
Connecticut Water Service Inc	$98	R	$487	0.60	A	4.4%
Middlesex Water Co	$128	R	$497	0.70	A	2.3%
SJW Corp	$304	R	$737	0.70	BBB+	8.3%
York Water Co	$47	R	$384	0.70	A-	5.3%
Average	$635		$2,560	0.68		5.9%

R: More than 80% of assets are regulated

Q39. How does the water utility sample compare to AWWU and ASU?

A. The sample consists of eight (8) companies with operations concentrated in the regulated water and wastewater industry. The sample companies are on average much larger than ASU (or AWWU).

ASU currently has a slightly higher bond rating than the average sample company, but (1) both ASU and the sample companies are highly rated and the difference is small, and (2) bond rating measures bond default risk rather than the cost of equity. Therefore, the impact of a slightly higher bond rating is simply that ASU has slightly lower default risk

than the average sample company,[48] which may be reflected in lower interest rates, which benefits customers. It does not, however, affect the cost of equity.

Finally, while the sample companies are investor-owned and publicly traded companies, AWWU is a municipal-owned entity that does not have publicly traded stock.[49]

Q40. Are there any differences in the regulatory environment in which the comparable companies and ASU operates?

A. While all jurisdictions to a degree are unique, I note that while Anchorage is more urbanized and faces less extreme weather than much of Alaska, the state of Alaska is unique in that it is much more thinly populated, faces difficulties engaging in construction for a substantial part of the year and thus makes some main and pipe replacements challenging. Alaska, unlike many states in the west, does not face water supply difficulties.

As for the specific risks that face ASU, I noted above the very high level of CIAC and debt. Mr. Persinger in his pre-filed testimony, AWWU's Treatment Director, discusses the increasingly stringent environmental standards ASU's wastewater treatment facilities must meet and the potential for additional standards as two of three wastewater treatment facilities are operating under administrative extensions of permits that have expired. In addition, ASU's largest wastewater treatment plant, Asplund, is permitted under a provision of the Clean Water Act, Section 301(h). Operation of the plant as a primary treatment facility is dependent on continuation of the ability to operate under the Section

[48] See footnote 31 above.

[49] As a result of being a municipal-owned entity, AWWU follows GASB while the sample companies follow GAAP; additionally AWWU has access to low interest loans from the State of Alaska, which are reflected in rates through lower cost of debt.

301(h) permit modification. If the modification is not renewed, secondary or possibly tertiary treatment of the wastewater may be required and will require significant upgrades to the Asplund treatment facility.

C. THE CAPM BASED COST OF EQUITY ESTIMATES

Q41. Please briefly explain the CAPM.

A. In the CAPM the collective investment decisions of investors in capital markets will result in equilibrium prices for all risky assets such that the returns investors expect to receive on their investments are commensurate with the risk of those assets relative to the market as a whole. The CAPM posits a risk-return relationship known as the Security Market Line (see Figure 1 in Section II), in which the required expected return on an asset is proportional to that asset's relative risk as measured by that asset's so-called "beta".

More precisely, the CAPM states that the cost of capital for an investment, S (e.g., a particular common stock), is given by the following equation:

$$\boldsymbol{r_s = r_f + \beta_s \times MRP} \qquad (1)$$

where $\boldsymbol{r_S}$ is the cost of capital for investment S;

$\boldsymbol{r_f}$ is the risk-free interest rate;

$\boldsymbol{\beta_S}$ is the beta risk measure for the investment S; and

$\boldsymbol{MRP}$ is the market equity risk premium.

The CAPM is a "risk-positioning model" that relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities. It says

that an investment whose returns do not vary relative to market returns should receive the risk-free interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 1). Further, it says that the risk premium of a security over the risk-free rate equals the product of the beta of that security and the Market Risk Premium: the risk premium on a value-weighted portfolio of all investments, which by definition has average risk.

1. Inputs to the CAPM

Q42. What inputs does your implementation of the CAPM require?

A. As demonstrated by equation (1), estimating the cost of equity for a given company requires a measure of the risk-free rate of interest and the market equity risk premium (MRP), as well as a measurement of the stock's beta. There are many methodological choices and sources of data that inform the selection of these inputs. I discuss these issues, along with the finance theory underlying the CAPM, in Exhibit BV-02 to my written evidence. I performed multiple CAPM calculations corresponding to distinct "scenarios" reflecting different values of the inputs. This allowed me to derive a range of reasonable estimates for the cost of equity capital implied by each of my samples.

Q43. What values did you use for the risk-free rate of interest?

A. I used the yield on a 20-year Government Bond as the risk-free asset for purposes of my analysis. Recognizing the fact that the cost of capital set in this proceeding will be in effect through at least 2017 and perhaps longer, I rely on a forecast of what Government bond yields will be one year out. Specifically, Blue Chip predicts that the yield on a 10-year Government Bond will be 2.6% by Q4, 2017.[50] I adjust this value upward by 53 basis points, which is my estimate of the representative maturity premium for the 20-year

[50] Blue Chip Economic Indicators, Consensus Forecasts, June 2016.

over the 10-year Government Bond.[51] This gives me a lower bound on the risk-free rate of 3.13%.

I also considered a scenario in which the appropriate risk-free rate of interest is 3.78%, which adds a portion of the increase in yield spread to the risk-free rate to take the downward pressure on the government bond yield into account. An alternative is to increase the MRP to reflect the widening of the yield spread.[52] The baseline Government bond yield of 3.13% reflects that Government bond yields are expected to increase substantially going forward.

Q44. What values did you use for the market equity risk premium (MRP)?

A. Like the cost of capital itself, the market equity risk premium is a forward-looking concept. It is by definition the premium above the risk-free interest rate that investors can *expect* to earn by investing in a value-weighted portfolio of all risky investments in the market. The premium is not directly observable, and must be inferred or forecasted based on known market information. One commonly used method for estimating the MRP is to measure the historical average premium of market returns over the income returns on government bonds over some long historical period. *Duff and Phelps* performs such a calculation of the MRP. The average market risk premium from 1926 to the present (2015) is 7%.[53] I used this value of the MRP in one input scenario to my CAPM analyses.

---

[51] This maturity premium is estimated by comparing the average excess yield on 20-year versus 10-year Government Bonds over the period 1990 - 2015, using data from Bloomberg.

[52] As of July, 2016, the spread between A rated utility and government bond yields was elevated by 76 basis points relative to the historical norm, so the application of only 65 basis points as an upward adjustment to the risk-free interest rate is conservative.

[53] See *Duff and Phelps 2015 Valuation Handbook*, p. 3-19.

However, investors may require a higher or lower risk premium, reflecting the investment alternatives and aggregate level of risk aversion at any given time. As explained in Section III, there is substantial evidence that investors' level of risk aversion remains elevated relative to the time before the global financial crisis and ensuing recession that commenced in 2008. In recognition of this evidence, together with forward-looking measurements of the expected market equity risk premium that are higher than the long-term historical average, I also performed CAPM calculations using 8% for the market equity risk premium. The 8% forecasted MRP is consistent with Bloomberg's current forecast.[54]

Q45. What is the basis for stating that the current MRP is higher than its historical average?

A. Academic articles that were written in the late 1990s or early 2000s often found that the U.S. MRP at the time was lower than its historical average based on various forward-looking models, such as market-wide versions of the DCF model. A recent article by Duarte and Rosa of the Federal Reserve of New York summarizes many of these models and also estimates the MRP from the models each year from 1960 through the present.[55] The authors find that the models are converging to provide more consensus around the estimate and that the average annual estimate of the MRP is consistent with the academic literature and with forward-looking estimates such as Bloomberg's. Their analysis shows that the U.S. MRP was lower than its long-term historical average in the early 2000s, but

[54] Bloomberg currently forecast the U.S. MRP at 7.95% over a 10-year Government bond while the increase in yield spread indicate an elevation in the MRP of up to 2.4%, so 8% over a 20-year government bond is a reasonable benchmark.

[55] Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Consensus of Models," *Federal Reserve Bank of New York*, December 2015 (Duarte & Rosa 2015).

is currently at an all-time high. Chart 3 from Duarte & Rosa 2015 was re-produced in Figure 6, which shows the average estimated MRP (over 30-day T-bills) for 20 models.

These findings are broadly consistent with the forward-looking MRP's calculated by Bloomberg albeit a bit higher even after downward adjustment for the maturity premium. I also note that the approximately 75 basis points elevation in the yield spread indicate a substantial elevation in the MRP.[56] However, I conservatively relied on the historical average MRP of 7% and a forward-looking MRP of 8% in my CAPM analysis.[57]

Q46. What betas did you use for the companies in your sample?

A. I used Value Line betas, which are estimated using five years of weekly data, which is consistent with approach taken in Order 10.[58]

2. The Empirical CAPM

Q47. Did you use any other CAPM-based model?

A. Yes. Empirical research has shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted.[59] A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to

---

[56] See Attachment 2, Section II for details.

[57] Following the evidence in standard finance textbooks, I rely on the arithmetic average for the historic market risk premium. See, for example, Brealey, Myers and Allen, "Principles of Corporate Finance," 11th Edition, 2014 pp. 162-163 and Ross, Westerfield and Jaffe, "Corporate Finance," 10th Edition, 2013 pp. 322-323. Reliance on an arithmetic historic average is also consistent with Order 10.

[58] Order 10 p. 40.

[59] See Figure BV 2- 3 in Exhibit BV-02 for references to relevant academic articles.

estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

The second variation on the CAPM that I employed makes use of these empirical findings. It estimated the cost of capital with the equation,

$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MRP - \alpha)} \quad (2)$$

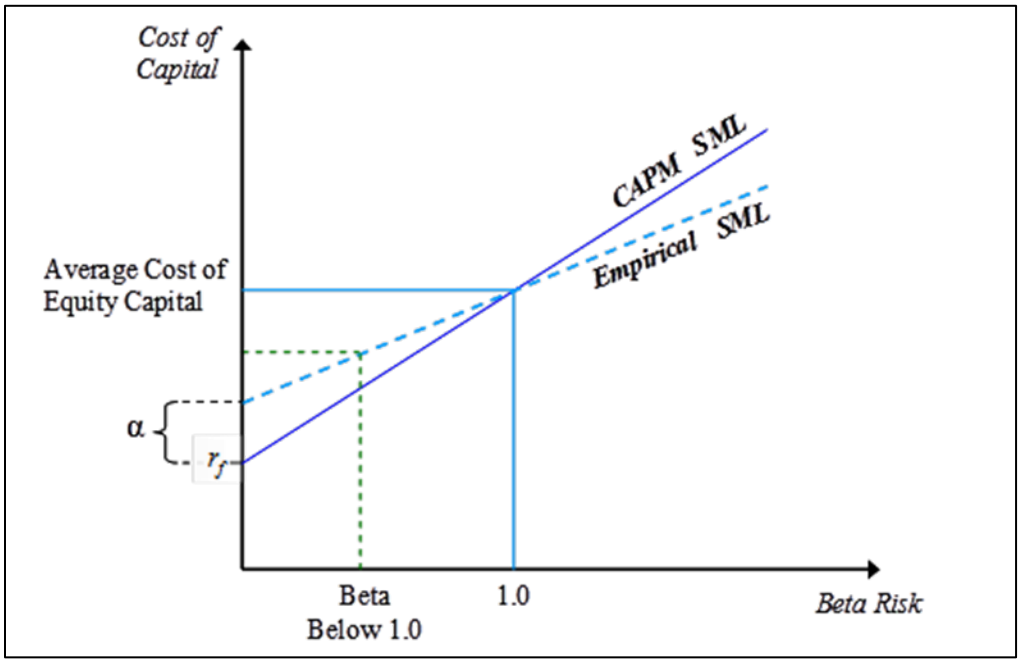
where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see equation (2) above).

I call this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line in Figure 1, which results in a Security Market Line that more closely matches the results of empirical tests. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

Q48. Why do you use the ECAPM?

A. Research shows that the analysis performs better empirically, when paired with the ECAPM, which recognizes the consistent empirical observation that the CAPM underestimates the cost of capital for low beta stocks. In other words, the ECAPM is based on recognizing that the actual observed risk-return line is flatter and has a higher intercept than that predicted by the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact, which has been established by repeated empirical tests of the CAPM. Exhibit BV-02 discusses the empirical findings that have tested the CAPM and also provides documentation for the magnitude of the adjustment, (α).

Figure 9: The Empirical Security Market Line



3. Results from the CAPM Based Models

Q49. Please summarize the parameters of the scenarios and variations you considered in your CAPM and ECAPM analyses.

A. The parameters for the two scenarios are displayed in Figure 10 below. The basis for using the scenarios is the empirical observation that the yield spread is higher than normal as is the forecasted MRP. The increased yield spread could reflect the increase in the MRP or downward pressure on the yield of government bonds due to a flight to quality or other factors. Therefore, I used the unadjusted forecast risk-free rate with a higher estimate of the MRP, and the unadjusted historical average MRP with the increased estimate of the risk-free interest rate as illustrated in Figure 10. This is a conservative approach as it is plausible that both downward pressure on the risk-free rate and upward pressure on the MRP could simultaneously occur. Scenario 1 normalizes the risk-free rate and uses a historical MRP while Scenario 2 uses an unadjusted forecast of the risk-free rate and a forecasted MRP. Because I did not simultaneously normalize both

the government bond rate and the MRP, my estimates are more likely to be downward than upward biased.

Figure 10: Parameters Used in CAPM-based Models

	Scenario 1	Scenario 2
Risk-Free Interest Rate	3.6%	3.0%
Market Equity Risk Premium	7.0%	8.0%

Q50. Please explain the difference between the data relied upon to estimate the cost of equity and the regulatory rate base to which the cost of equity is applied.

A. Both the CAPM and the DCF models rely on market data to estimate the cost of equity for the sample companies, so the results reflect the value of the capital that investors hold during the estimation period (market values). The allowed return on equity is applied to the fair value rate base, which could be financed differently than the sample companies.

Q51. Why is this difference important to the estimation of the cost of equity?

A. Taking differences in financial leverage into consideration does not change the value of the rate base, but it does consider the fact that the more debt a company has, the higher the financial risk associated with an equity investment is.[60] To see this I constructed a simple example below, where only the financial leverage of a company varies. I assumed the return on equity is 11% at a 50% equity capital structure and determined the return on equity that would result in the same overall return if the percentage of equity in the capital structure were reduced to 45%.

[60] See Exhibit BV-02 for a description of common practice and underlying finance principles related to the impact of financial risk on the cost of equity.

Figure 11
Illustration of Impact of Financial Risk on Allowed ROE

	Company A (50% Equity)	Company B (45% Equity)
Rate Base	$1,000	$1,000
Equity	$500	$450
Debt	$500	$550
Cost of Debt (5%)	$25	$27.5
Return on Equity	$55	$42.5
Total Cost of Capital (7.5%)	**$80**	**$80**
ROE / Implied ROE	11%	11.67%

The table above illustrates how financial risk affects returns and also the allowed ROE: the overall return does not change, but the allowed ROE required to produce the same return goes up in recognition of the increased risk to equity investors caused by the higher degree of financial leverage.

The principle illustrated in Figure 11 is an example of the adjustments I performed to account for differences in financial risk when conducting estimates of the cost of equity applicable to ASU. I considered financial risk using several commonly used methods including the method commonly referred to as the Hamada method in textbooks[61] to avoid undue influence from any one set of assumptions.[62] The Hamada method looks to the equity beta that is estimated from market data and derives an equivalent asset beta

[61] See, for example, Berk & DeMarzo 2014, Chapter 14. A detailed explanation is also included in Exhibit BV-02.

[62] These methods include calculating the ROE implied by the overall cost of capital as illustrated in Figure 10, as well as two versions of the so-called Hamada method for levering and unlevering betas in the CAPM and ECAPM. See Exhibit BV-02 for further discussion and detail.

that assumes the assets are financed 100% by equity. The method then relevers the beta to be consistent with the capital structure relied upon by the target company. There are multiple versions of the Hamada method that are differentiated by the assumptions they make about the systematic risk of debt (e.g., debt betas) and the impact of taxes. To avoid unduly biasing the estimation by the specific assumptions, I estimate the cost of equity using three different methods: (1) as in Figure 11 above, I assume the overall cost of capital remains constant regardless of capital structure, (2) I use the Hamada method assuming taxes are irrelevant, and (3) I use the Hamada method assuming taxes are relevant. As there is no consensus in the academic literature about which method is the most accurate in general, I present all three methodologies.

Q52. How does CIAC impact ASU?

A. Just like increased leverage increases the financial risk for a utility, the magnitude of CIAC magnifies the volatility in income or change in net position. The following example illustrates this.

Assume as above that both Companies A and B have a rate base of $1,000 and that the allowed ROE is 10.25% while the cost of debt is 5%. Further assume that operations, maintenance, administrative and general costs are $800. The only difference between the two companies is how their rate base is financed. Specifically, Company A is financed 50-50 with debt and equity, while Company B is financed with 40% debt, 40% equity, and 20% CIAC, which earns a return of zero. The base case is illustrated in Figure 12 below.

Figure 12: The Impact of CIAC on Income Volatility – Base Case

	Company A	Company B
Rate Base	$1,000	$1,000
Debt	$500	$400
Equity	$500	$400
CIAC	$0	$200
O&M and A&G cost	$800	$800
Debt Cost	$25	$20
Allowed Equity Return	$51	$41
Revenue Requirement	$876	$861
Income	**$51**	**$41**

Note that income divided by equity is exactly 10.25%.

Now assume for simplicity that both Companies A and B experience an increase in cost with no impact on revenue. The realized income and return is shown in Figure 13 below.

Figure 13: The Impact of CIAC on Income Volatility – Cost Increase

	Company A	Company B
Revenue	$876	$861
Cost	$866	$861
Income	$10	$0
Realized ROE	2.0%	0.0%

It is clear from Figure 12 and Figure 13 above that the presence of CIAC makes the utility more vulnerable to fluctuations in cost (or revenues). Hence, an increase in CIAC increases the volatility of a utility's income or change in net position, everything else being equal. Given the large volume of CIAC that is present on ASU's balance sheet, it is exceptionally vulnerable to changes in its operating cost or operating revenues.

Q53. Can you summarize the results from applying the CAPM-based methodologies?

A. Yes. The results are presented in Figure 14 below.[63]

Figure 14: Water Utility Sample CAPM-Based Results

Estimated Return on Equity	Scenario 1 [1]	Scenario 2 [2]
Financial Risk Adjusted Method		
CAPM	10.2%	10.3%
ECAPM (α = 1.5%)	10.8%	10.9%
Hamada Adjustment Without Taxes		
CAPM	9.8%	10.0%
ECAPM (α = 1.5%)	10.0%	10.2%
Hamada Adjustment With Taxes		
CAPM	9.4%	9.6%
ECAPM (α = 1.5%)	9.7%	9.9%

ASU and AWU do not pay taxes, but the comparable companies do. Therefore, the estimated cost of equity for a water / wastewater utility with 52% equity is presented using all three methods and range from 9.4% to 10.9% with a midpoint of about 10.2%.

Q54. How do you interpret the results of your CAPM and ECAPM analyses?

A. The results are in a wide range from 9.4% to 10.9%, but the majority of the results are in the range of 9¾% to 10¾% and therefore the midpoint of 10.2% is a reasonable point estimate for the CAPM and ECAPM.

[63] Tables and supporting schedules detailing my cost of capital calculations for Water Utility sample are contained in Exhibit BV-03.

D. THE DCF BASED ESTIMATES

1. Single- and Multi-Stage DCF Models

Q55. Can you describe the DCF approach to estimating the cost of equity?

A. The DCF model attempts to estimate the cost of capital for a given company directly, rather than based on its risk relative to the market as the CAPM does. The DCF method simply assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow—literally a stream of expected "cash flows" discounted at a risk-appropriate discount rate. When the cash flows are dividends, that discount rate is the cost of equity capital:

$$\boldsymbol{P_0} = \frac{\boldsymbol{D_1}}{\boldsymbol{1+r}} + \frac{\boldsymbol{D_2}}{\boldsymbol{(1+r)^2}} + \frac{\boldsymbol{D_3}}{\boldsymbol{(1+r)^3}} + \cdots + \frac{\boldsymbol{D_T}}{\boldsymbol{(1+r)^T}} \qquad (3)$$

Where $\boldsymbol{P_0}$ is the current market price of the stock;

$\boldsymbol{D_t}$ is the dividend cash flow expected at the end of period $\boldsymbol{t}$;

$\boldsymbol{T}$ is the last period in which a dividend cash flow is to be received; and

$\boldsymbol{r}$ is the cost of equity capital.

Importantly, this formula implies that if the current market price and the pattern of expected dividends are known, it is possible to "solve for" the discount rate, r that makes the equation true. In this sense, a DCF analysis can be used to estimate the cost of equity capital implied by the market price of a stock and market expectations for its future dividends.

Many DCF applications make the assumption the growth rate last forever, so the formula can be rearranged to estimate the cost of capital. Specifically, the implied DCF cost of

equity can then be calculated using the well-known "DCF formula" for the cost of capital:

$$\boldsymbol{r = \frac{D_1}{P_0} + g = \frac{D_0}{P_0} \times (1 + g) + g} \qquad (4)$$

where $\boldsymbol{D_0}$ is the current dividend, which investors expect to increase at rate $\boldsymbol{g}$ by the end of the next period, and over all subsequent periods into perpetuity.

Equation (4) says that if equation (3) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the single-stage DCF model; it is also known as the Gordon Growth model. I note that this is the DCF model relied upon by the Commission in Order 10.[64]

Q56. Are there different versions of the DCF model?

A. Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models that use cash flow rather than dividends, or versions that combine aspects of (i) and (ii).[65] One such alternative expands the Gordon Growth model to three stages. In the multistage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period. [66]

A common implementation of the multi-stage DCF is to assume that companies grow their dividend for 5-years at the forecasted company-specific rate of earnings growth, the growth then tapering over the next 5-years toward the growth rate of the overall economy

[64] Order 10, pp. 40-44.

[65] The Surface Transportation Board uses a cash flow based model with three stages. See, for example, Surface Transportation Board Decision, "STB Ex Parte No. 664 (Sub-No. 1)," Decided January 23, 2009.

[66] See Exhibit BV-02 for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

(i.e., the long-term GDP growth rate forecasted to be in effect 10 years or more into the future). Variations of this model have historically been used in a large number of jurisdictions as have I although I consider many of its features problematic in the current environment. The model may combine two conservative elements: (1) The current dividend yield may be lower than expected going forward for the reasons discussed in Figure 7 above and (2) the current GDP forecast is much lower than its historical average. Thus, the combination of these two elements may lead to unusually low DCF estimates of the cost of equity. As a result, I believe the result merits less weight than the Gordon growth model discussed above.[67] However, the model has the advantage of allowing for different growth rates at different future points.

Q57. What are the relative strengths and weaknesses of the DCF versus CAPM based methodologies for estimating the cost of equity capital?

A. Current market conditions affect all cost of capital estimation models to some degree, but the DCF model has at least one advantage over the CAPM-based models as it includes contemporaneous stock prices and forward-looking growth, whereas the CAPM relies on historical data to estimate systematic risk and (in some cases) the market risk premium.

2. DCF Inputs and Results

Q58. What growth rate information did you use?

A. I looked to a sample of investment analysts' forecasted earnings growth rates for companies in my samples. I used investment analyst forecasts of company-specific growth rates sourced from *Value Line* and Thomson Reuters *IBES*, which is consistent

[67] I include the estimation results to be consistent with my prior filing in e.g., U-13-201 and U-13-202.

with Order 10's reliance on analysts' forecasts from several public sources.[68] For the multi-stage version, I also use Blue Chip growth forecasts.

Additionally, I relied on the dividend yield of the companies, which I estimate using the most recently available dividend information (currently) and the average of the last 15 days of stock prices ending June 30, 2016.[69] As the single largest advantage of the DCF model is that it uses current market information, I find it is important to use a relatively short time period to determine the dividend yield – yet to avoid the bias caused by any one day. I believe a 15-day average accomplishes that goal. Because the stock price of utilities currently is higher than they historically have been and because some companies engage in share buybacks, the dividend yield underestimates the yield on cash distributions to investors.

Q59. Please address the input data in the DCF model.

A. The Gordon Growth/single-stage DCF models require forecast growth rates that reflect investor expectations about the pattern of dividend growth for the companies over a sufficiently long horizon, but estimates are typically only available for 3-5 years.

One issue with the data is that it includes solely dividend payments as cash distributions to shareholders, while some companies also use share repurchases to distribute cash to shareholders. To the extent that companies in my samples use share repurchases, the DCF model using dividend yields will underestimate the cost of equity for these

[68] Order 10, p. 37 cites growth forecasts from Value Line, First Call, Zacks, and Reuters. I note that First Call / Reuter is now part of Thomson Financial and that Zacks obtain many of its forecasts from IBES.

[69] The Commission in Order 10 (p. 35) used a six month average – because it was the most current.

companies. While there are companies in my sample that have engaged in share buybacks in the past, the magnitude is currently not large.

A second issue is that the flight to quality has resulted in higher than usual stock prices for water utilities and hence lower than usual dividend yields. As a result, the dividend yield may be downward biased. The multi-stage DCF model additionally requires a measure of the long-term GDP growth and I report the results from two potential inputs – Blue Chip's forecasted GDP growth and the historically experienced GDP growth.

Q60. What are the DCF based cost of equity estimates for the samples?

A. The results are presented in Figure 15 below.[70] I note that the growth rates in the model (shown in Table BV-Water 6) range from 2.3% to 9.7% and average about 6%, so that there appears to be no extreme observations.

Figure 15: DCF Results for Water Utility Sample

	Cost of Equity Estimates
Single-Stage DCF	11.3%
Multi-Stage DCF	8.5%

In Order 10, the Commission emphasized the simple Gordon Growth model and I believe that it is a much more reasonable estimate at the current time than the multi-stage DCF, which is impacted by both the very low dividend yield and low GDP rate. As a result, I believe the multi-stage DCF deserves limited weight.

Q61. How do you interpret the results of your DCF analyses?

[70] Tables and supporting schedules detailing my cost of capital calculations are included in Exhibit BV-03.

A. The DCF model estimates range from 8.5% to 11.3%, but note that the combined impact of the elevated P/E ratios and the low GDP growth render the multi-stage DCF downward biased. However, if the impact of the elevated P/E ratios due to low interest rates is considered, the estimates increase by about 0.25% for a range of 8.75% to 11.55% and a midpoint of 10.15%, which is within the range of the CAPM-based estimates.

E. RISK PREMIUM MODEL ESTIMATES

Q62. Did you estimate the cost of equity that results from an analysis of risk premiums implied by allowed ROEs in past utility rate cases?

A. Yes. In this type of analysis, sometimes called the "risk premium model", the cost of equity capital for utilities is estimated based on the historical relationship between allowed ROEs in utility rate cases and the risk-free rate of interest at the time the ROEs were granted. These estimates add a "risk premium" implied by this relationship to the relevant (prevailing or forecasted) risk-free interest rate:

$$Cost\ of\ Equity = r_f + Risk\ Premium$$

Q63. What are the merits of this approach?

A. First, it estimates the cost of equity from regulated entities as opposed to holding companies, so that the relied upon figure is directly applicable to a rate base. Second, the allowed returns are clearly observable to market participants, who will use this one data input to making investment decisions, so that the information is at the very least a good check on whether the return is comparable to that of other investments. Third, I analyze spread between the allowed ROE at a given time and the then prevailing interest rate to ensure that I properly consider the interest rate regime at the time the ROE was awarded.

This implementation ensures that I can compare allowed ROE granted at different times and under different interest rate regimes.

Q64. How did you use rate case data to estimate the risk premiums for your analysis?

A. The data from 2004-2014 is derived from AUS Consultants, the data for 2015 was collected from the sample companies 10-Ks and data for 2016 was obtained from SNL.[71] Using this data I compared (statistically) the average allowed rate of return on equity granted by U.S. state regulatory agencies in water utility rate cases to the average 20-year Treasury bond yield that prevailed in each quarter.[72] I calculated the allowed utility "risk premium" in each quarter as the difference between allowed returns and the Treasury bond yield, since this represents the compensation for risk allowed by regulators. Then I used the statistical technique of ordinary least squares (OLS) regression to estimate the parameters of the linear equation:

$$Risk\ Premium = A_0 + A_1 \times (Treausury\ Bond\ Yield) \qquad (5)$$

I derived my estimates of A_0 and A_1 using standard statistical methods (OLS regression) and find that the regression has a high degree of explanatory power in a statistical sense (R^2=0.96) and the parameter estimates, A_0=0.09191% and A_1= -0.7471, are statistically significant. The negative slope coefficient reflects the empirical fact that regulators grant smaller risk premiums when risk-free interest rates (as measured by Treasury bond yields) are higher. This is consistent with past observations that the premium investors require to hold equity over government bonds increases as

[71] The data sources varied as I do not have access to one consistent source.

[72] I rely on the 20-year government bond to be consistent with the analysis using the CAPM and to avoid confusion about the risk-free rate. While it is important to use a long-term risk-free rate to match the long-lived nature of the assets, the exact maturity is a matter of choice.

government bond yields decline. In the regression described above, the allowed ROE on average declined by less than 100 basis point when the government bond yield declined by 100 basis points. Based on this analysis, I find that the current market conditions are consistent with an ROE of 10.0%.

I also determine the ROE that is consistent with the risk premium granted over the past 12 years, which result in an ROE estimate of 10.1%.

Q65. What conclusions did you draw from your risk premium analysis?

A. While the Commission did not rely on the risk premium models in Order 10 and the risk premium models based on historical allowed returns are not underpinned by fundamental finance principles in the manner of the CAPM or DCF models,[73] I believe they can provide useful benchmarks for evaluating whether the estimated ROE is consistent with recent practice. My risk premium model cost of equity estimates demonstrate that the results of my DCF and CAPM analyses are in line with the actions of utility regulators. Because the risk premium analysis as implemented takes into account the interest rate prevailing during the quarter the decision was issued, it provides a useful benchmark for the cost of equity in any interest environment.

V. RISK CHARACTERISTICS AND THE COST OF EQUITY

A. BACKGROUND

Q66. Please summarize your ROE evidence.

A. Based on my analysis, I find the range of ROE estimates displayed in Figure 16 below.

[73] The data available for water utilities is limited and not from a consistent source. I therefore do not consider the risk premium results a primary estimate but a confirmation that the CAPM and DCF based results are reasonable.

Figure 16: Range of ROE Estimates

	Water Sample	Midpoint
	[1]	[2]
CAPM	9.4% - 10.3%	9.9%
ECAPM	9.7% - 10.9%	10.3%
Simple DCF	11.3%	11.3%
Multi-Stage DCF	8.5%	8.5%
Risk Premium	10.0% - 10.1%	10.1%
Midpoint		10.0%
Recommended ASU ROE		10.25%

I note that if I assign 60% weight to the Simple Gordon Growth Model and 40% weight to the CAPM as did Order 10, the resulting ROE is 10.6%. I agree that the multi-stage DCF deserve less weight than does the Gordon growth model. Further, as ASU faces unique risks in the form of (i) its smaller size, (ii) a very high level of CIAC relative to other balance sheet items, (iii) challenges earning its allowed ROE and (iv) high capital expenditures going forward, I believe that ASU needs to be placed above the midpoint.

Q67. Please summarize your findings regarding ASU's capital structure and cost of equity.

A. Based on the analysis discussed above and supported by my workpapers, I find that a capital structure including 52% equity and a ROE of 10.25% is reasonable. This recommendation is consistent with my empirical analysis using the DCF model and CAPM and also with the risk premium model. I also note that the primary methods relied upon such as the CAPM and DCF are similar to those used in Order 10 and result in a lower recommended ROE than would have been the case under the methodology used in Order 10.

Q68. Does this conclude your pre-filed direct testimony?

A. Yes.